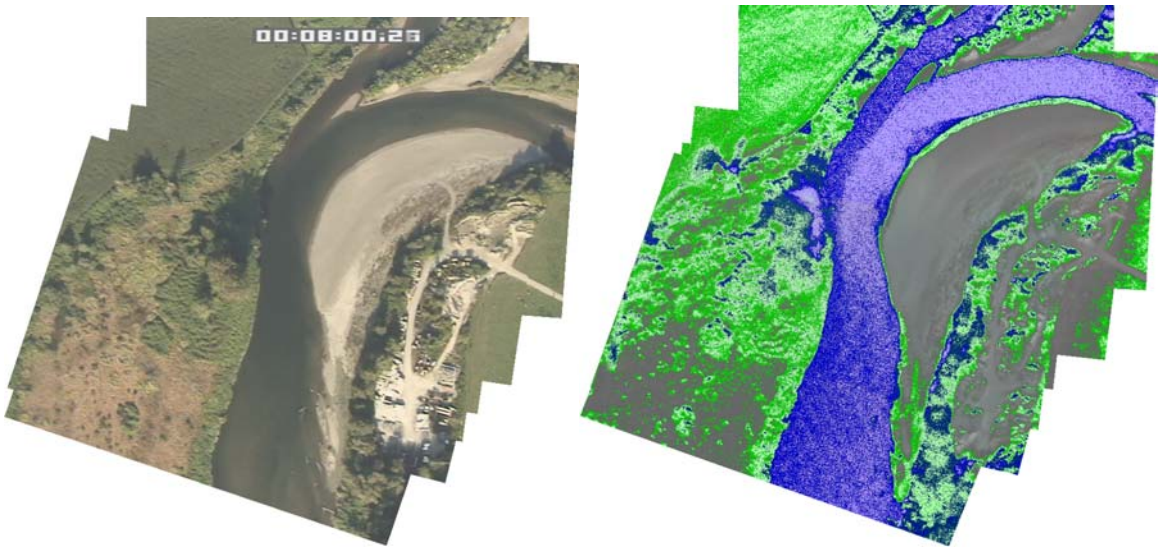
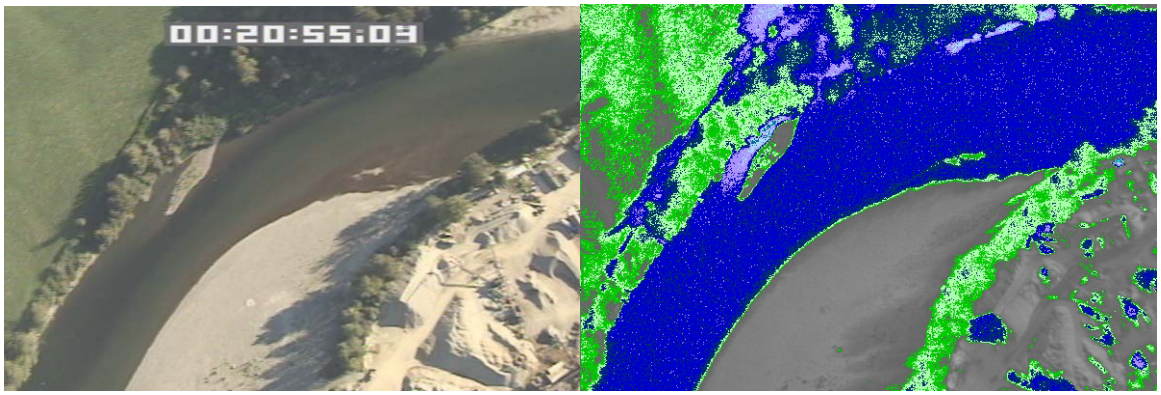
Appendix A – Selected Images from the Stillaguamish River Survey

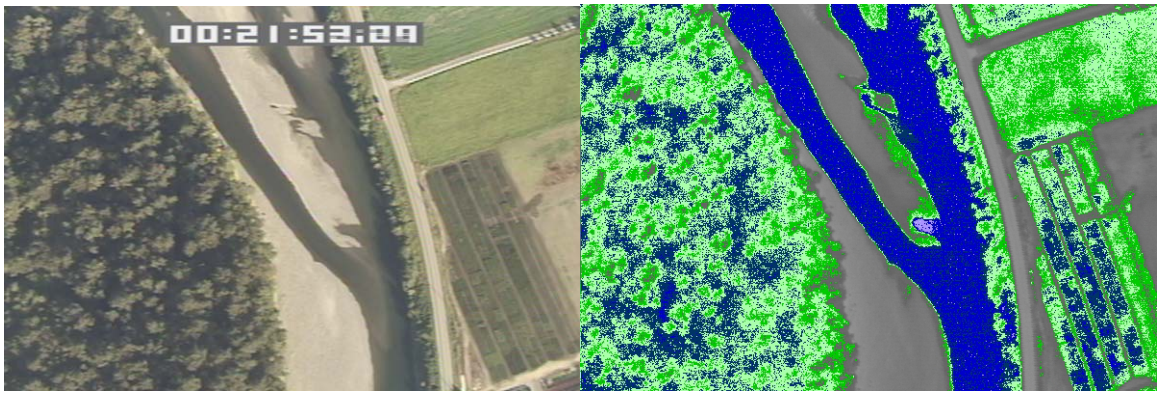
Stillaguamish River (9/7/2001)



Frame: stil0405-0412 – Visible band/TIR images showing the confluence of South Slough (15.6°C) and the Stillaguamish River (15.9°C) at river mile 5.6.

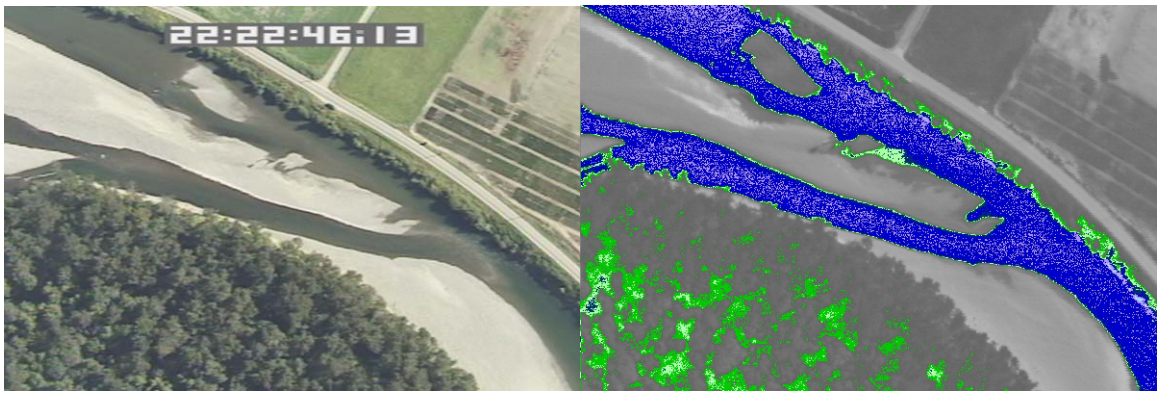


Frame: stil0799 – Visible band/TIR image pair showing a cool seep or spring (15.8°C) along the right bank of the Stillaguamish River at (16.8°C) river mile 15.8.



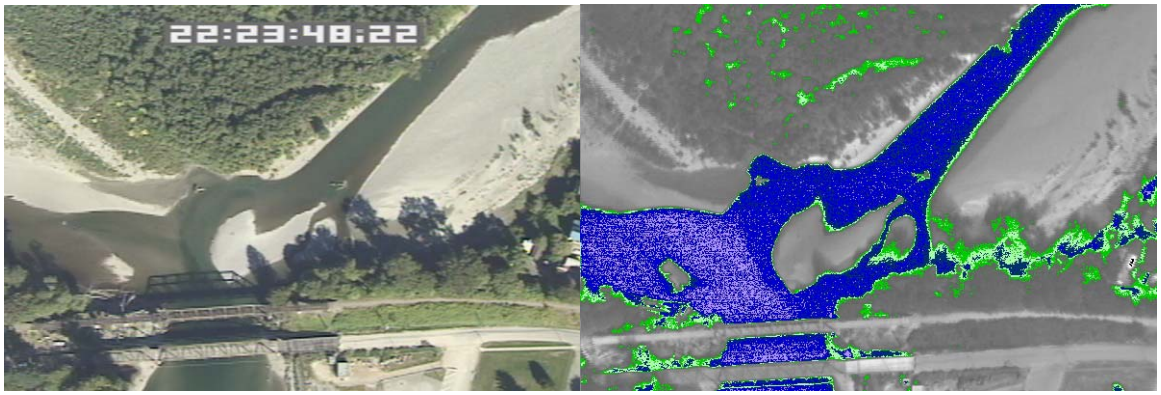
Frame: stil0828 – Visible band/TIR image pair showing the confluence of two side channels on the Stillaguamish River (16.6°C) at river mile 16.7. An apparent cool water seep (15.5°C) is visible at the downstream end of gravel bar.

Stillaguamish River (9/8/2001)

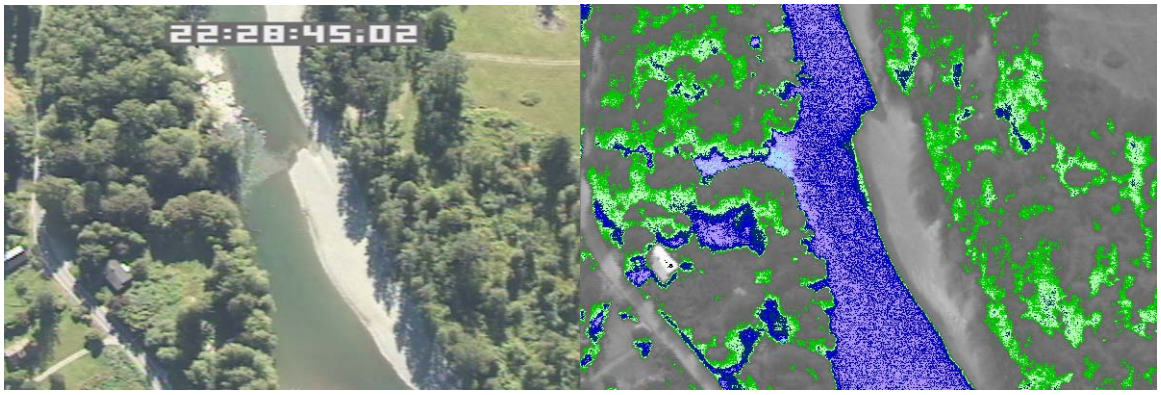


Frame: sfs0607 – Visible band/TIR image acquired on 9/8/01 showing the same segment of the Stillaguamish River that is displayed in the previous image (frame: stil0828; 9/7/01). The images show the temperature differences between the days. In addition, the apparent cool water seep in the 9/7/01image was not detected on 9/8/2001.

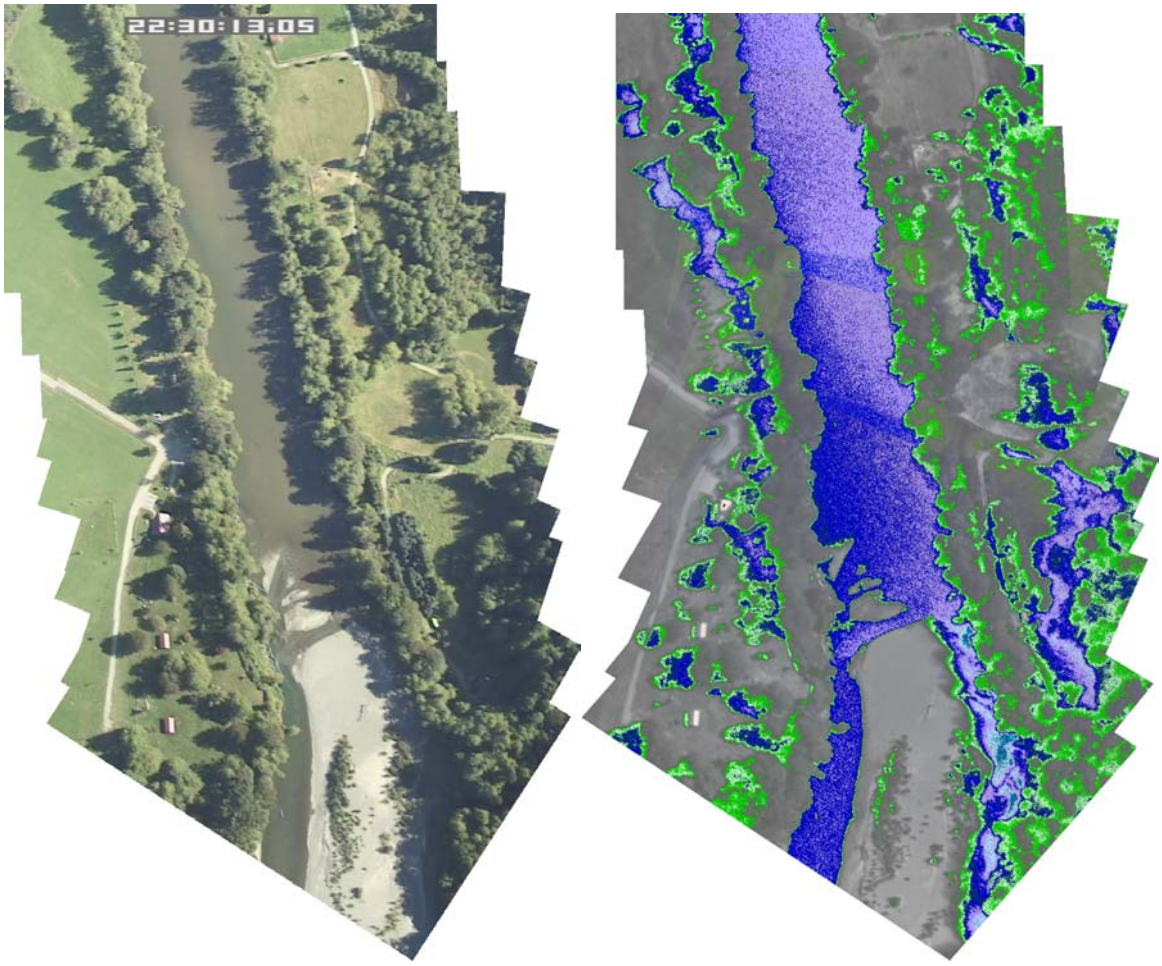
South Fork Stillaguamish River



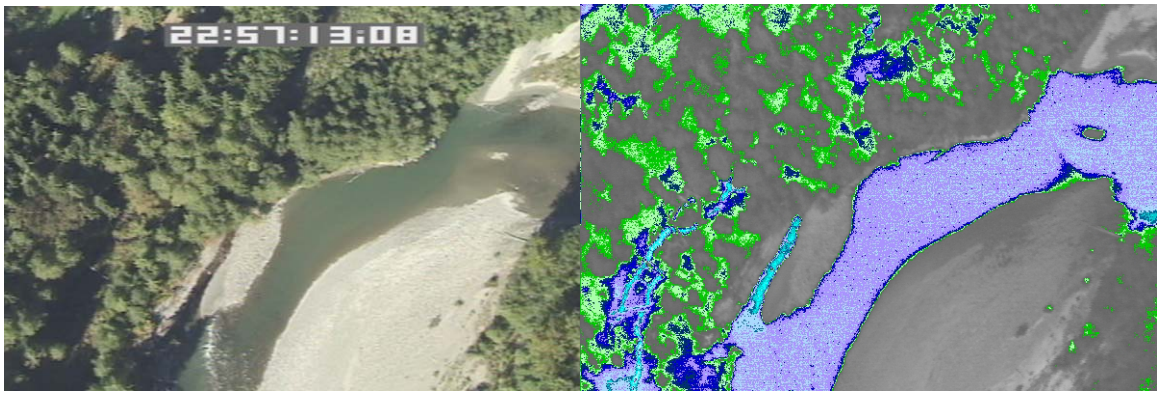
Frame: sfs0638 – Visible band/TIR images showing confluence of the South Fork Stillaguamish River (16.4°C) and the North Fork Stillaguamish River (16.0°C). The South Fork flows in from the top right side of the image.



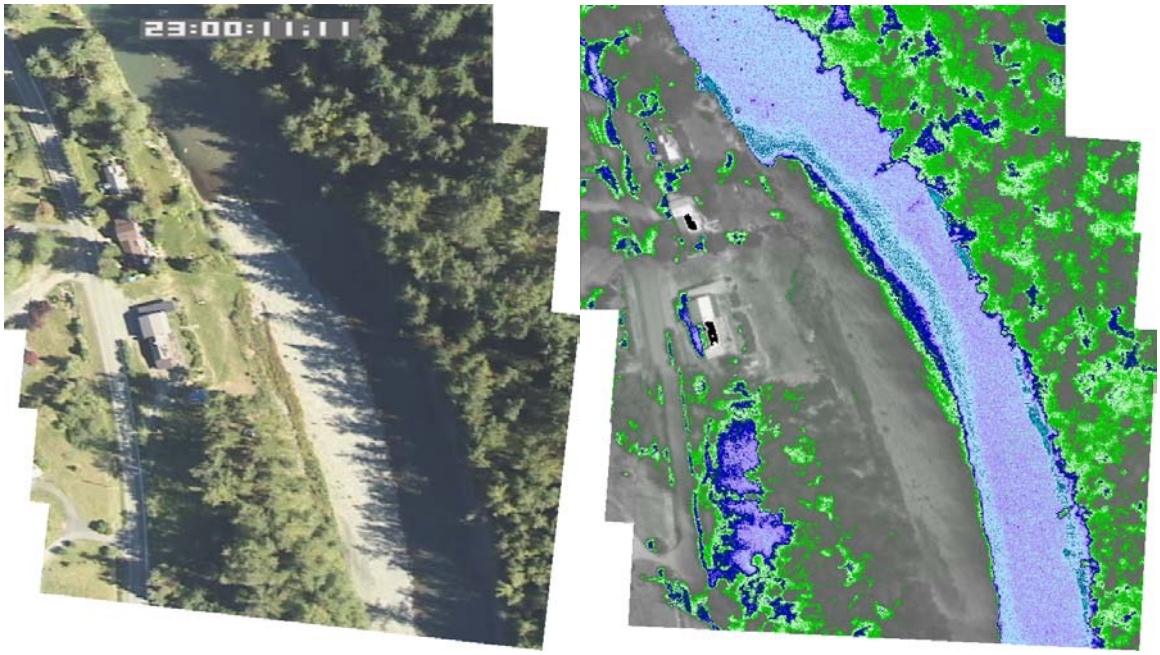
Frame: sfs0786 – Visible band/TIR image pairs showing the confluence of Jim Creek (14.9°C) and the SF Stillaguamish River (15.8°C) at river mile 3.8. Flow direction is from the top to bottom of the image and Jim Creek flows in from the left side of the image.



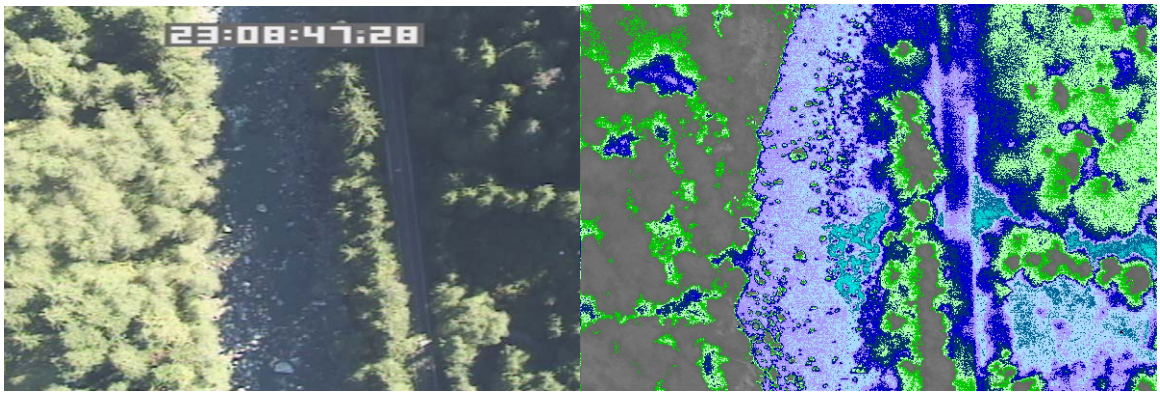
Frame: sfs0820-0830 – Visible band/TIR image mosaics showing the South Fork Stillaguamish River at river mile 4.8. Stream temperatures show an apparent change from 15.6°C upstream to 16.3°C downstream (flow is from the top to the bottom of the images). The images also show how shadows on the gravel bar in the bottom ¼ of the image can create surface temperatures that are cooler than in-stream temperatures.



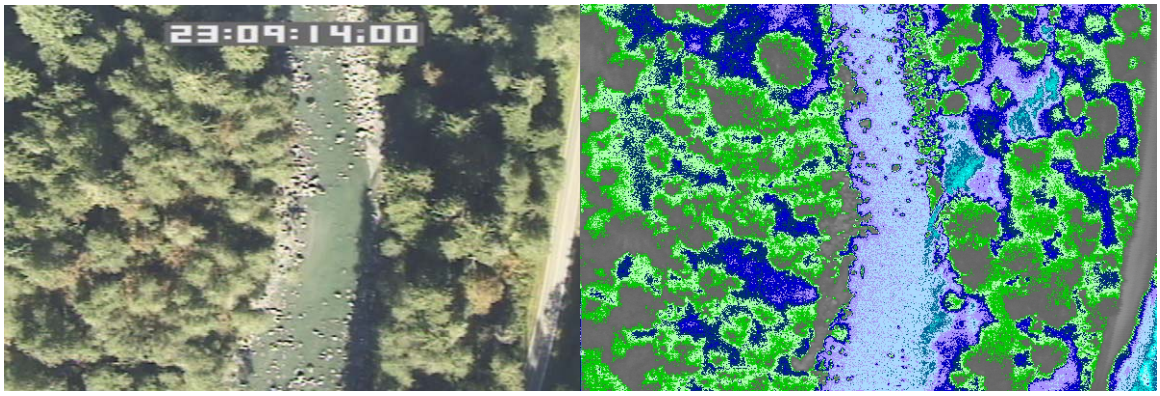
Frame: sfs1640 – Visible band/TIR image showing an unnamed inflow (11.9°C) entering the right bank of the South Fork Stillaguamish River (15.3°C) at river mile 24.5. Flow direction is from the top to bottom of the image.



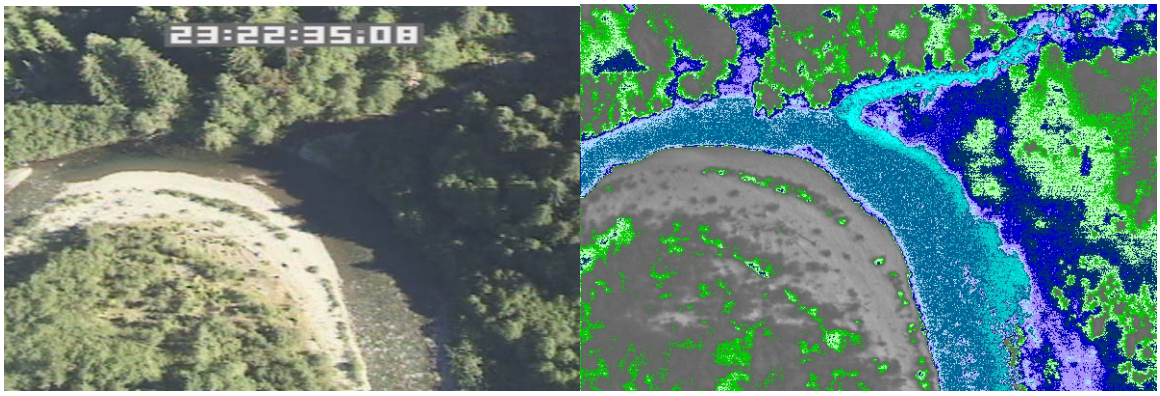
Frame: sfs1726-1729 – Visible band/TIR image mosaic showing an apparent cool water input (14.0°C) along the right bank (looking downstream) of the SF Stillaguamish River 14.9°C at river mile 26.6. The inflow could not be positively identified.



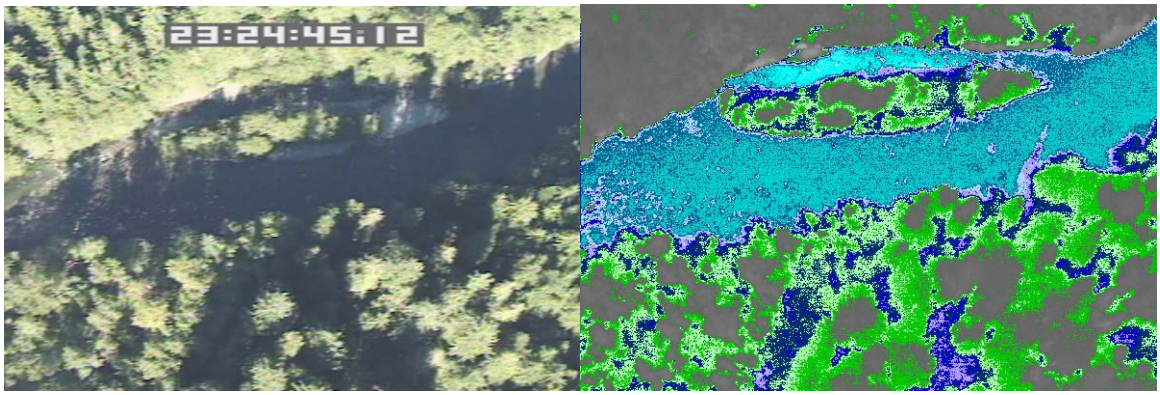
Frame: sfs1942 – Visible band/TIR image showing the confluence of Twenty-two Creek (12.5°C) and the SF Stillaguamish River (15.1°C) at river mile 30.7. The SF Stillaguamish River flows from the top to bottom of the image and Twenty-two Creek flows in from the right side of the image. The images also illustrate the long visible shadows that were common near the end of the survey.



Frame: sfs1955 – Visible band/TIR image showing the confluence of Hemple Creek (12.6°C) and the SF Stillaguamish River (14.7°C) at river mile 30.9. Hemple Creek empties into the left bank of the SF Stillaguamish River. Compared to the previous image (frame: 1942), this image pair shows how a change of stream alter changes the level of visible shadows on the stream channel.

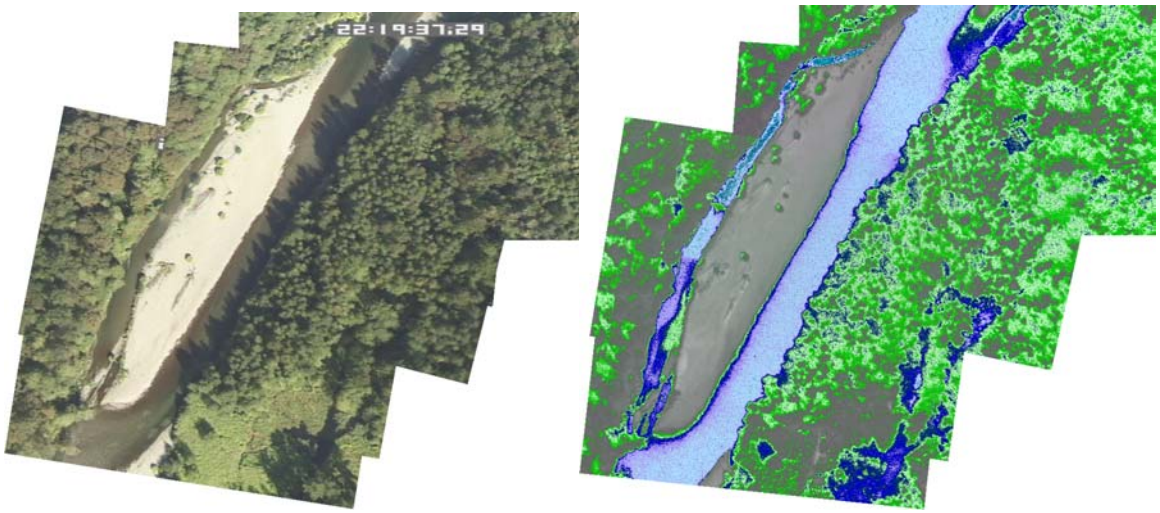


Frame: sfs2355 – Visible band/TIR image showing the confluence of Blackjack Creek, (11.8°C) and the South Fork Stillaguamish River (13.4°C) at river mile 38.7.



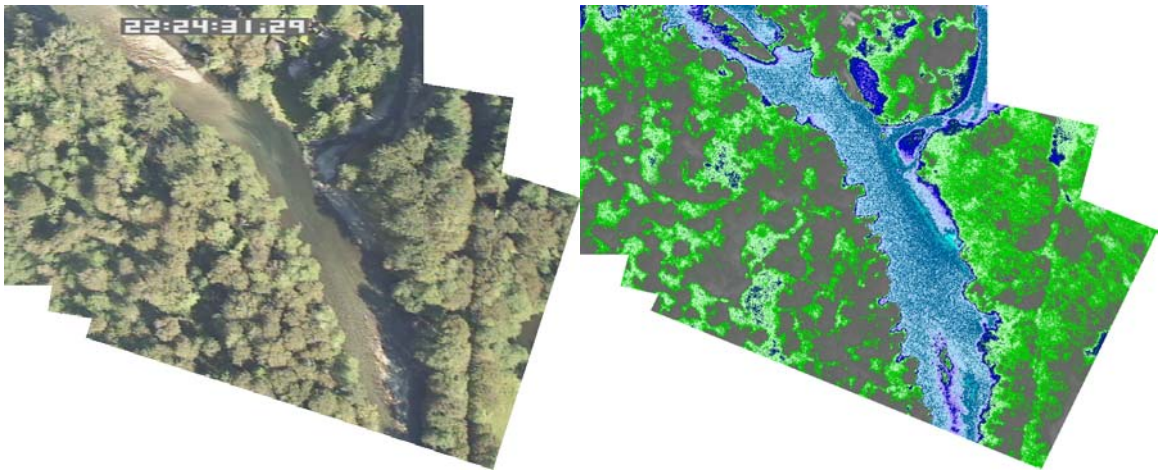
Frame: sfs2420 – Visible band/TIR images showing an apparent cool side channel on the right bank of the South Fork Stillaguamish River at river mile 39.8. Although the side channel appears to contain cooler water, it was not sampled as a tributary because it could not be positively identified and it did not have a detectable influence on mainstem temperatures.

North Fork Stillaguamish River

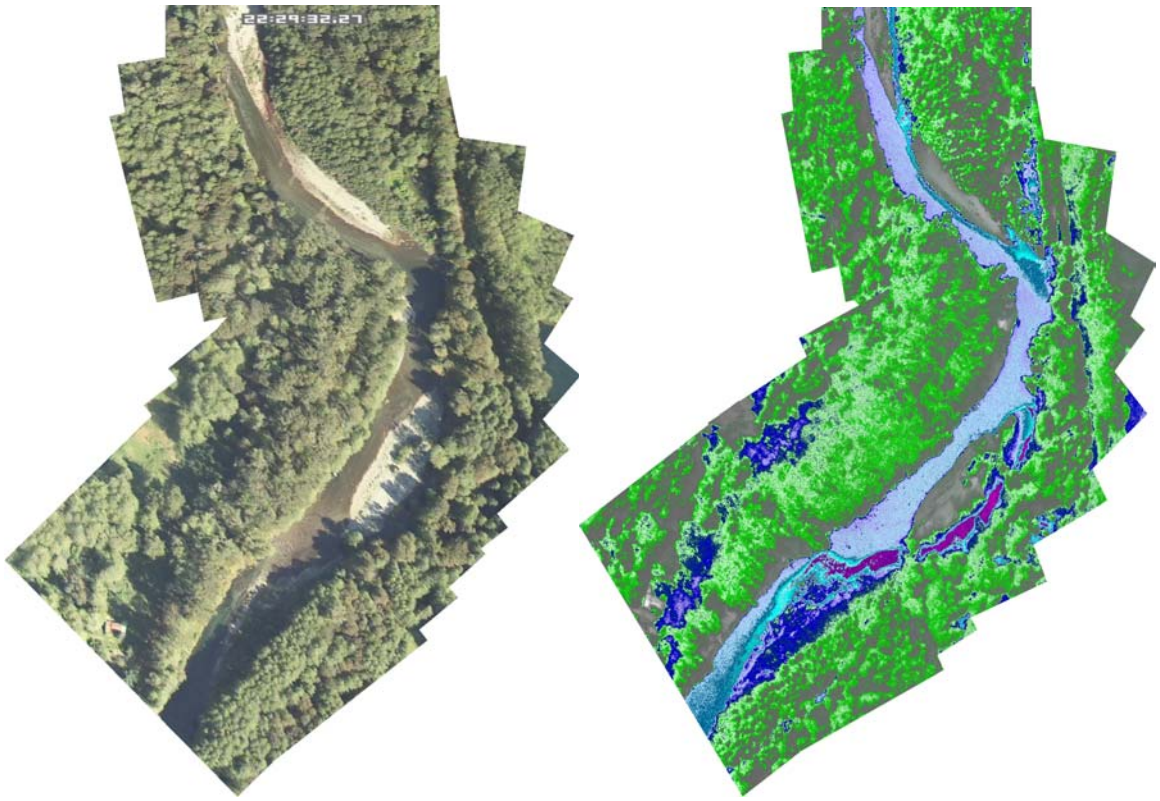


Frame: nfst0873-0878 – Visible band/TIR image mosaic showing a cooler side channel on the right bank of the North Fork Stillaguamish River at river mile 22.7. The channel varies in temperature from 12°C upstream to 16°C downstream while the mainstream measured 14.7°C. Flow direction is from the top to bottom of the image.

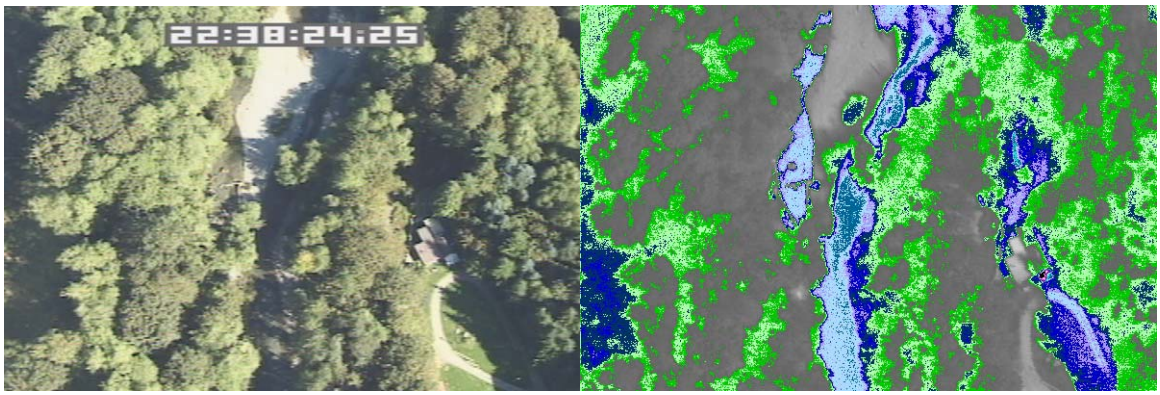
Frame: nfst0946-0958 – Visible band/TIR image showing the confluence of the Little Boulder River (12.7°C) and the NF Stillaguamish River (13.4°C) at river mile 23.4. The left bank temperature measures 13°C while the right bank temperature is 14.5°C.



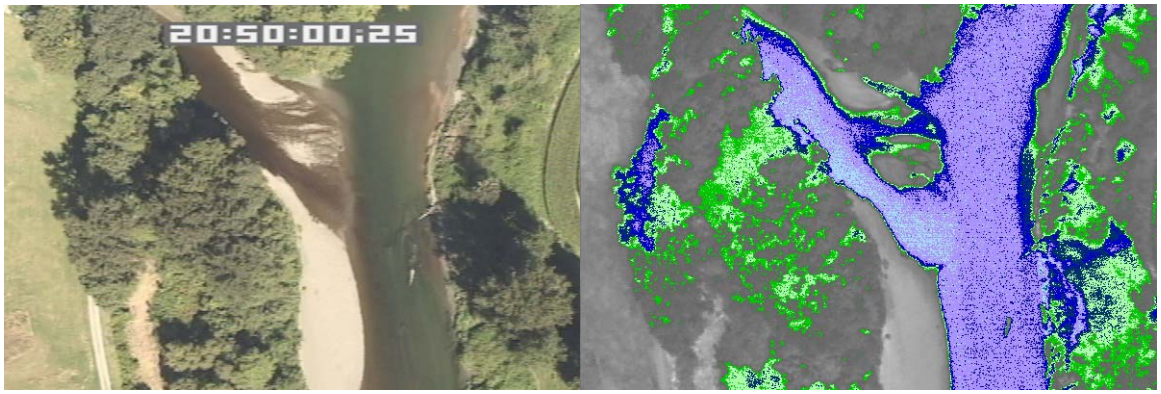
Frame: nfst1023-1025 – Visible band/TIR image pairing the confluence of French Creek (13.4°C) and the NF Stillaguamish River (13.9°C) at river mile 25.7.



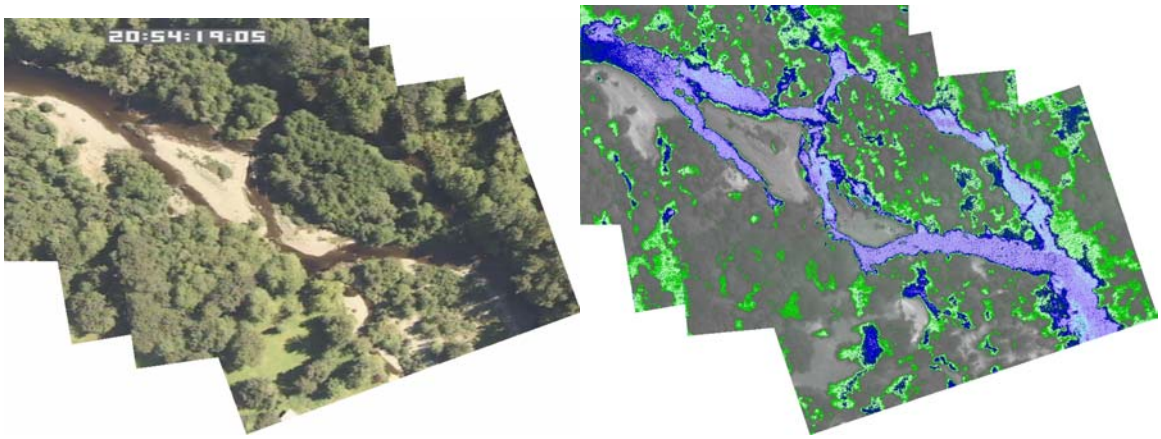
Frame: nfst1118-1132 – Visible band/TIR image pair showing an apparent spring along the left bank of the NF Stillaguamish River at river mile 27.8. Spring input measures between 9-11°C while the main stem of the river measures 14.9°C. This inflow was not mapped on the USGS topographic maps.



Frame: nfst1398 – Visible band/TIR image pair showing cool region along the left bank of the NF Stillaguamish River at river mile 33.5. The cool region appears to be an inflow, but is could not be positively identified due to canopy masking and visible shadows.

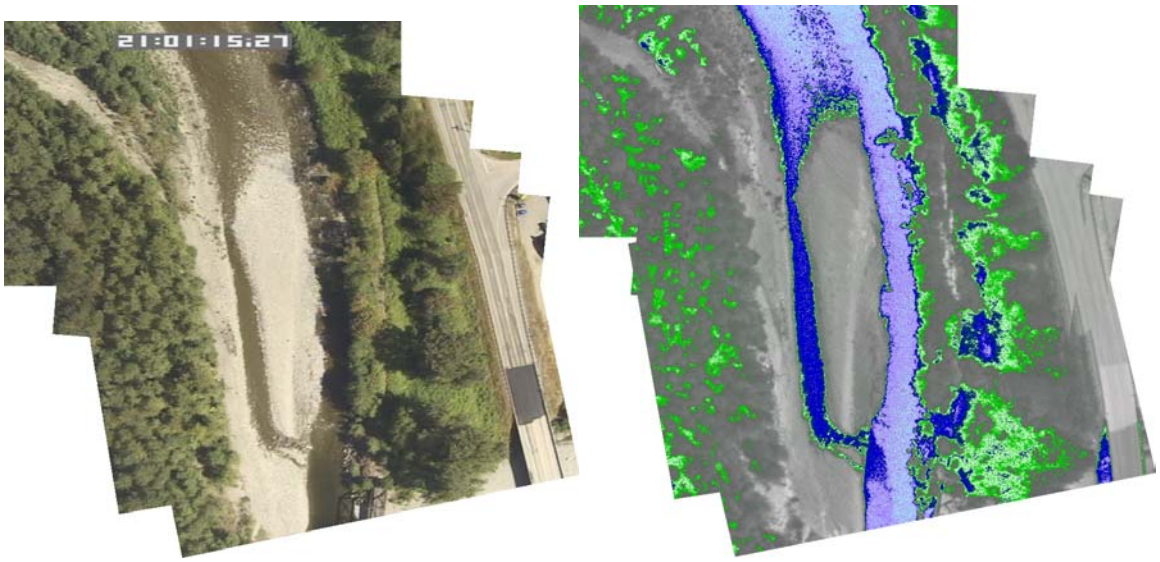


Frame: pil0019 – Visible band/TIR images showing the confluence of Pilchuck Creek (15.0°C) to the right bank of the Stillaguamish River (15.1°C). Flow direction is from the top to bottom of the image.

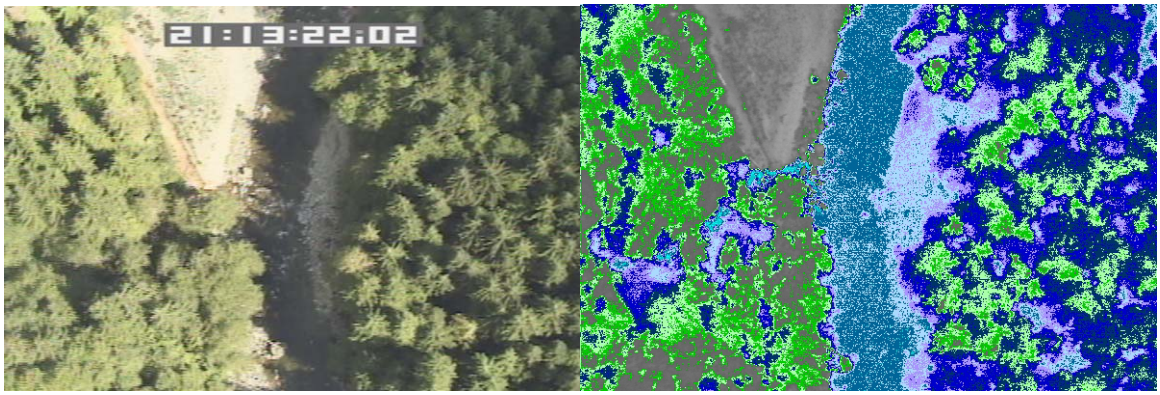


Frame: pil0145-0148 – Visible band/TIR image showing a segment of Pilchuck Creek at river mile 2.5. The image shows multiple stream channels, riparian vegetation, and shadow lines that were characteristic of this reach of Pilchuck Creek.

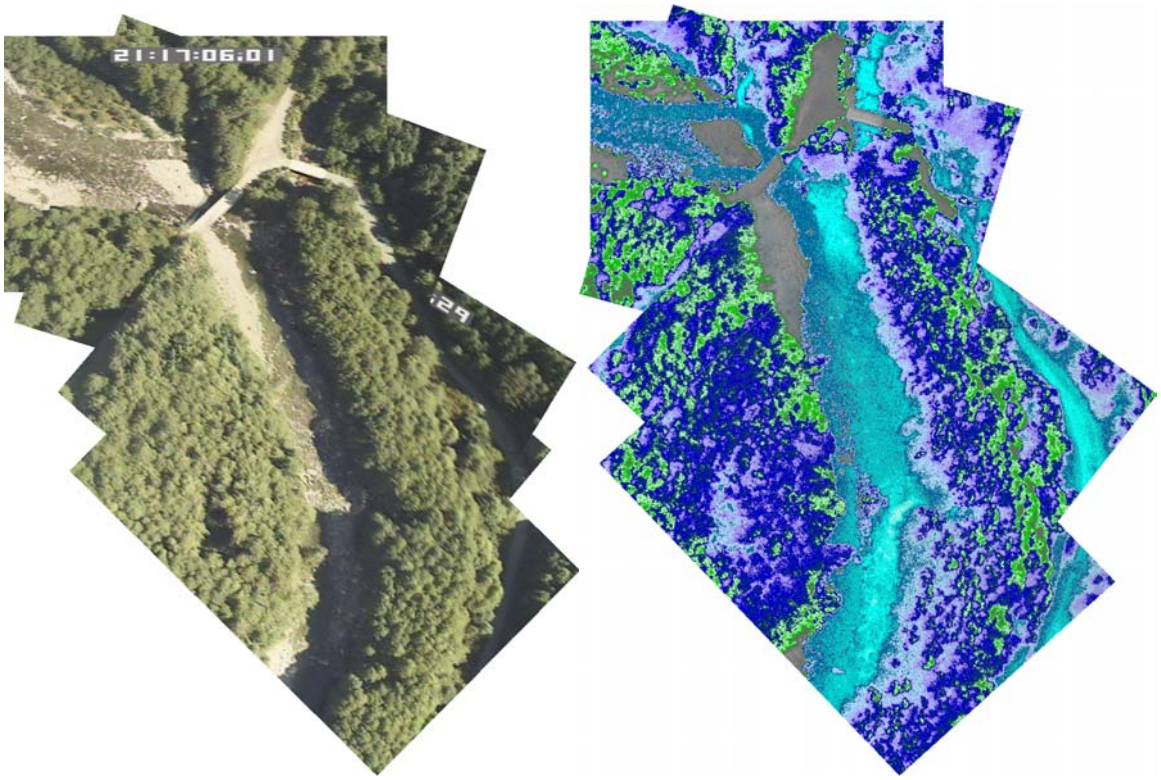
Deer Creek



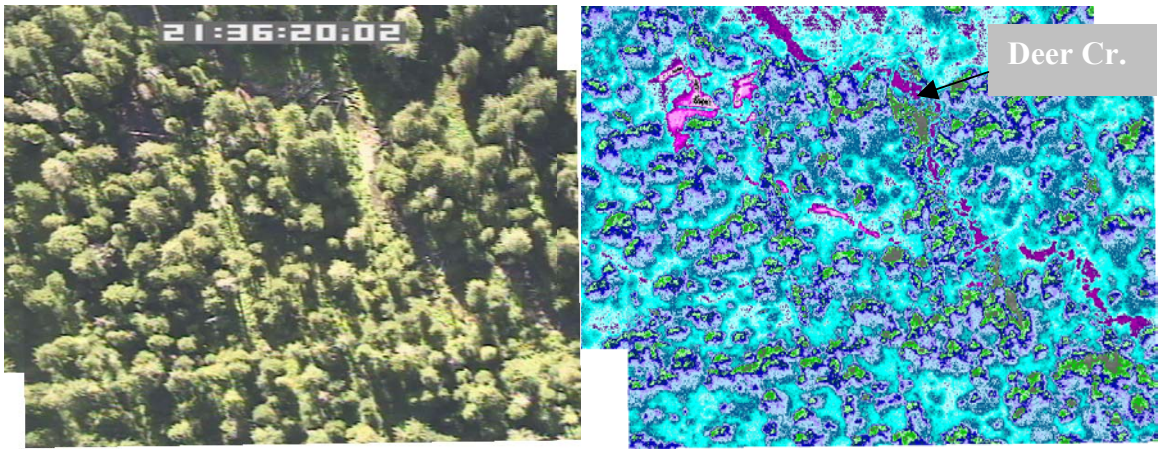
Frame: deer0042-0047 – Visible band/TIR image mosaic showing a warm side channel on the right bank of Deer Creek at river mile 0.2. The side channel measured 16.5°C while the mainstream's temperature was 15.2°C.



Frame: deer0410 – Visible band/TIR image pair showing the confluence of Deer Creek (13.8°C) there is an unnamed tributary (12.1°C) at river mile 8.2. Flow direction is from the top to bottom of the image and the tributary flows in to the right bank (looking downstream).

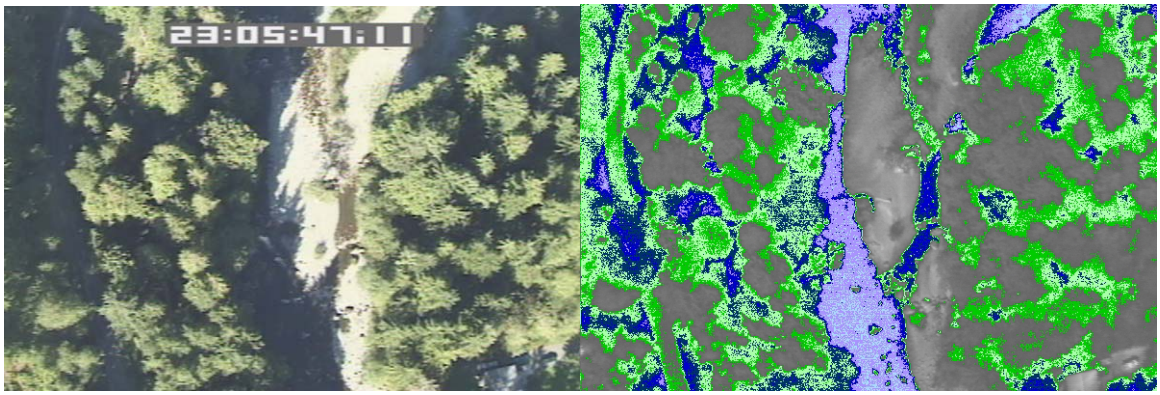


Frame: deer0517-0522 – Visible band/TIR image mosaic showing the confluence of Rick Creek (10.7°C) to the left bank of Deer Creek (12.8°C) at river mile 10.5.

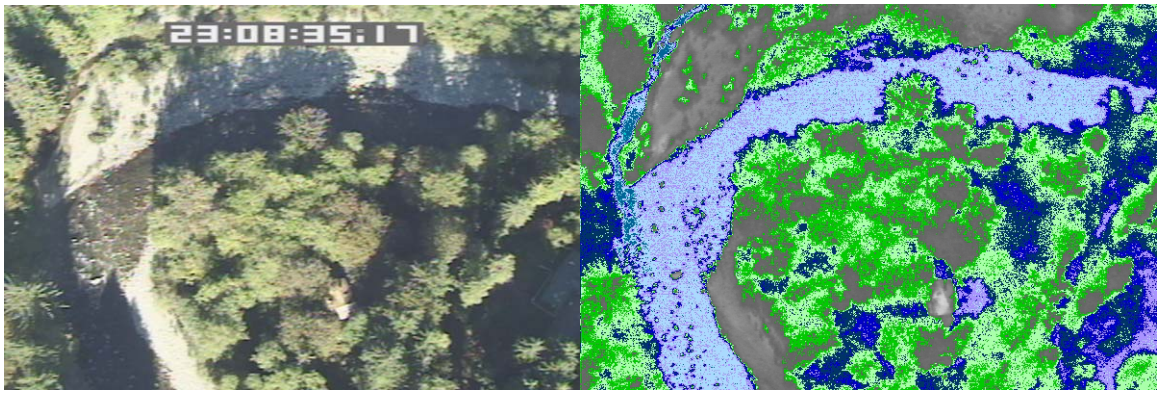


Frame: deer1098-1099 – Visible band/TIR image pair showing Deer Creek (8.9°C) at river mile 22.1. A cool region, possibly a spring, is visible along the right bank of Deer Creek. However, the source of the colder surface temperatures could not be positively determined. The image also shows the cool environment and low thermal contrast observed in the upper reaches.

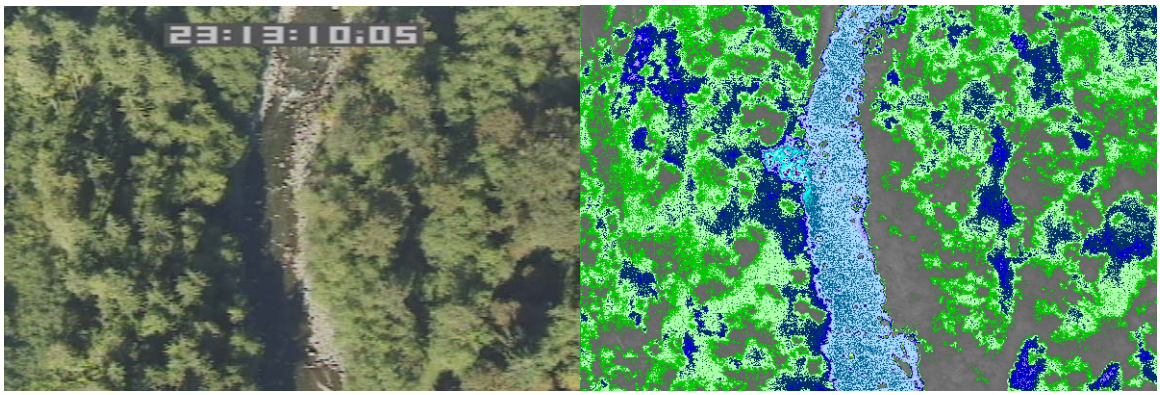
Canyon Creek



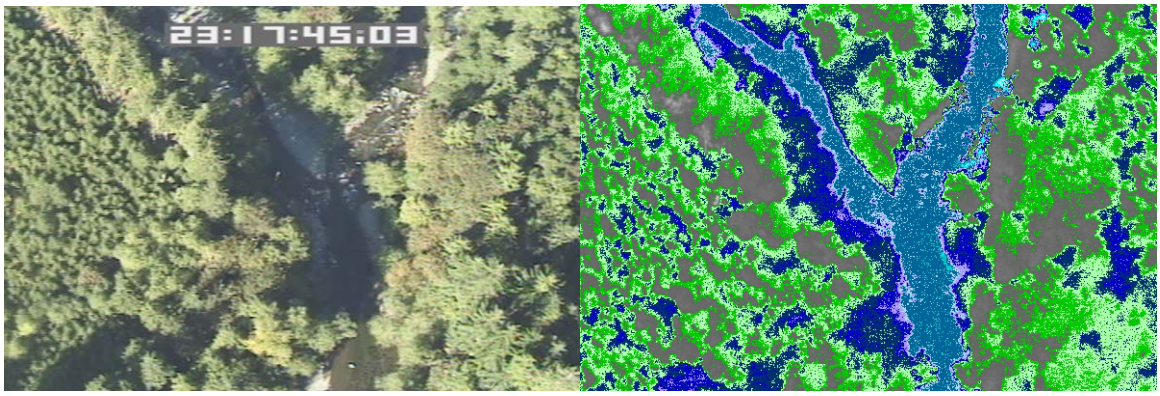
Frame: can0098 – Visible band/TIR image showing a warm side channel (16.0°C) on the left bank of Canyon Creek (15.0°C) at river mile 1.2.



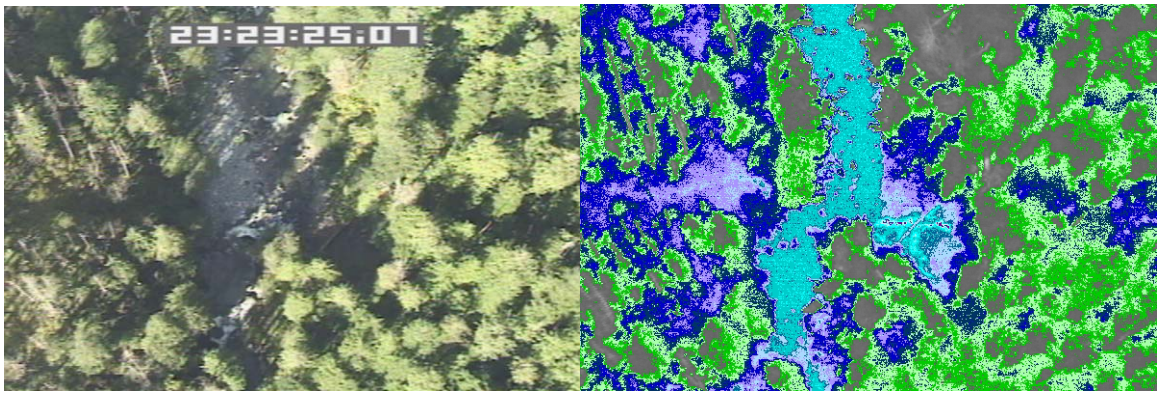
Frame: can0182 – Visible band/TIR image showing an inlet from Jordan Ponds (13.8°C) on the right bank of Canyon Creek (14.7°C).



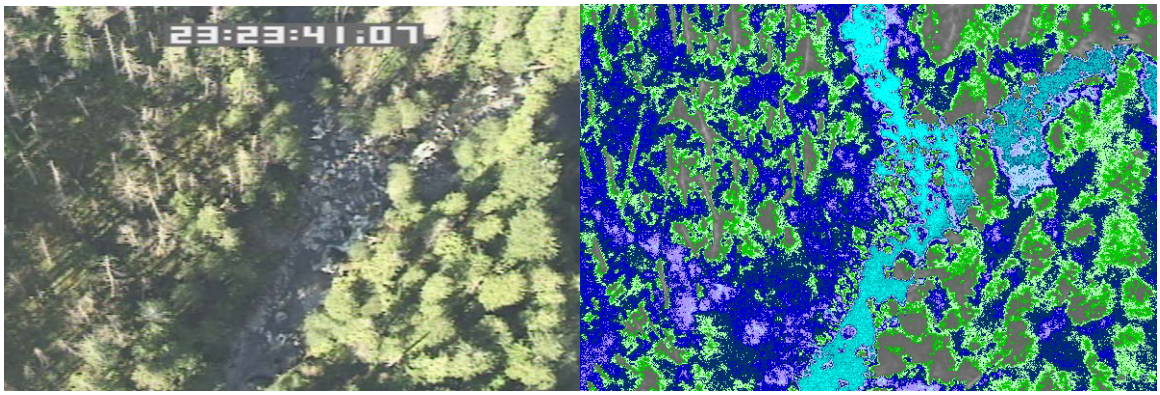
Frame: can0319 – Visible band/TIR image pair showing a cold region on the right bank of Canyon Creek (14.1°C) that is an inlet from Mud Lake (10.7°C).



Frame: can0457 – Visible band/TIR image pair showing apparent cool water seeps along the left bank of Canyon Creek at river mile 7.6. Flow direction is from top to bottom of the image.



Frame: can0627 – Visible band/TIR image pair showing an apparent spring along the left bank of Canyon Creek at river mile 11.0. Some uncertainty exists in this classification since the cold region is in shadows on the visible band image and does not have a detectable influence on mainstem temperatures.



Frame: can0635 – Visible band/TIR image pair showing the confluence of the South Fork (12.7^{o}C) and North Fork Canyon Creek (11.8^{o}C) at river mile 11.1.